

In the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application. Please cancel claim 1 without prejudice to or disclaimer of the subject matter therein. Please add new claims 2-34. No new matter has been added.

Claim 1 (Canceled)

2. (New) A method, comprising:

sending a source wave;

sending a set of values associated with control parameters, said control parameters including at least one of a steady-state magnitude value, a frequency value, and a duration value associated with the source wave, the steady-state magnitude value associated with a steady-state magnitude of the source wave, the frequency value associated with a frequency of the source wave, the duration value associated with a duration of output of haptic feedback;

sending impulse parameters, including:

an impulse value, the impulse value associated with an impulse force level of the source wave, the value of the impulse force level being different from the value of the steady-state magnitude;

a settle time, the settle time associated with a time for a magnitude of the force signal to change from the impulse force level to the value of the steady-state magnitude; and

sending a force signal, the force signal based on the source wave, the set of control parameters, and the set of impulse parameters, the haptic feedback being based on the force signal.

3. (New) The method of claim 2, wherein the haptic feedback is output via at least one actuator.

4. (New) The method of claim 2, wherein the source wave includes one of a constant profile, a sine wave, a square wave, a triangular wave, and a force profile.

5. (New) The method of claim 2, wherein the data values associated with the force signal are time-varying data values.

6. (New) The method of claim 2, wherein the impulse value is higher than the steady-state magnitude value, the settle time associated with a time for a magnitude of the force signal to decay from the value of the impulse force level to the value of the steady-state magnitude.

7. (New) The method of claim 2, wherein the settle time is less than one order of magnitude faster than a steady-state time associated with a duration of the steady-state magnitude.

8. (New) The method of claim 2, wherein the force signal is generated at the steady-state magnitude value after an expiration of the settle time.

9. (New) The method of claim 2, wherein the force wave is terminated based on the duration value.

10. (New) The method of claim 2, further comprising sending a value for each application parameter from a set of application parameters, said application parameters specifying a vector of the force signal.

11. (New) The method of claim 2, further comprising sending a set of trigger parameters, the set of trigger parameters specifying a generation of the haptic feedback based on an activation of a switch of a haptic feedback device.

12. (New) The method of claim 11, further comprising outputting the haptic feedback based on the value of each trigger parameter from the set of trigger parameters, the trigger parameters being based on actuation of switches of a haptic feedback device.

13. (New) A device, comprising:

a sensor configured to detect a position of a manipulandum and to output a position signal associated with a position of the manipulandum;

a local microprocessor configured to communicate with a host computer, the local microprocessor configured to output an impulse-shaped force signal; and

an actuator electrically coupled to the local microprocessor and configured to receive the impulse-shaped force signal, the actuator configured to output haptic feedback based on the impulse-shaped force signal, the haptic feedback including a first magnitude at a time and a second magnitude at a time different from the time of the first magnitude, the second magnitude being different from the first magnitude.

14. (New) The device of claim 13, wherein the local microprocessor is configured to receive the impulse-shaped force signal from a host processor of the host computer, the local microprocessor being configured to relay the impulse-shaped force signal to the actuator.

15. (New) The device of claim 13, wherein the local microprocessor is configured to receive a source wave from the host computer and adjust the source wave to provide the impulse-shaped force signal to the actuator.

16. (New) The device of claim 15, wherein the local microprocessor is configured to add a value of a control parameter and a value of an impulse parameter to the source wave to provide the impulse-shaped force signal, the value of the control parameter being operative to modify a frequency and a magnitude of the impulse-shaped force signal, the value of the impulse parameter being operative to modify the value of the magnitude of the impulse-shaped force signal.

17. (New) The device of claim 16, wherein the value of the control parameter is operative to modify a duration and a DC voltage offset of the impulse-shaped force signal.

18. (New) The device of claim 16, wherein the value of the impulse parameter is operative to modify an impulse magnitude and a settle time.

19. (New) The device of claim 16, wherein the impulse-shaped force signal further includes an application parameter operative to indicate a direction of the haptic feedback.

20. (New) The device of claim 16, further comprising at least one button coupled to the manipulandum, the impulse-shaped signal further including a trigger value to indicate which buttons are associated with the output of the haptic feedback generated by the impulse-shaped signal.

21. (New) The device of claim 15, further comprising a local memory coupled to the local microprocessor, the local memory configured to store a digital representation of the impulse-shaped force signal.

22. (New) The device of claim 13, wherein the impulse-shaped force signal is one of a condition and an effect, the condition being based on a position of the manipulandum, the effect being independent of the position of the manipulandum.

23. (New) The device of claim 13, wherein the host computer is configured to display a plurality of images on a visual output device and manipulate the plurality of images based on the sensor signals.

24. (New) A method, comprising:

receiving a set of values associated with control parameters, said control parameters including at least one of a steady-state magnitude value, a frequency value, and a duration value for a source wave, the steady-state magnitude value associated with a steady-state magnitude of the source wave, the frequency value associated with a frequency of the source wave, the duration value associated with a duration of output of haptic feedback;

receiving a set of impulse parameters, including:

an impulse value, the impulse value associated with an impulse force level of the source wave, the value of the impulse force level being different from the steady-state magnitude value;

a settle time, the settle time associated with a time required for a magnitude of the force signal to change from the impulse force level to the steady-state magnitude value; and

receiving a force signal, the force signal based on the source wave, the set of control parameters, and the set of impulse parameters, the haptic feedback being based on the force signal.

25. (New) The method of claim 24, wherein the source wave, the control parameters, and the impulse parameters are received from a host computer, the force signal being generated by a local microprocessor different from the host computer.

26. (New) The method of claim 24, wherein the haptic feedback is output by an actuator.

27. (New) The method of claim 24, wherein the impulse value is higher than the steady-state magnitude value, the settle time associated with a required for a magnitude of the force signal to decay from the impulse force value to the steady-state value.

28. (New) The method of claim 24, wherein the force signal is generated at the steady-state value after an expiration of the settle time.

29. (New) The method of claim 24, wherein the source wave includes one of a constant profile, a sine wave, a square wave, a triangular wave, and a stored force profile, the force profile being stored on a local memory device.

30. (New) The method of claim 24, wherein the steady-state magnitude value is included in the set of control parameters, the steady-state magnitude value being a specified percentage of a maximum force output of an actuator.

31. (New) The method of claim 24, wherein the settle time is at most about one-tenth of a duration of the steady-state magnitude value.

32. (New) A device, comprising:

a manipulandum;

a sensor configured to detect a position of the manipulandum and output a position signal, the position signal being based on the position of the manipulandum; and

an actuator configured to receive an impulse-shaped force signal, said actuator configured to apply a force to the manipulandum in accordance with the impulse-shaped force signal such that a force having an impulse magnitude value at a time, followed by a steady-state magnitude value different from the impulse magnitude value at a time different from the time associated with the impulse magnitude value, is applied to said manipulandum.

33. (New) The device of claim 32, further comprising a local microprocessor coupled to the actuator and configured to communicate with a host computer, the local microprocessor being configured to receive parameters from the host computer, generate the impulse-shaped force signal based on a source wave received from the host computer, and output the impulse-shaped force signal to the actuator.

34. (New) The device of claim 32, wherein the steady-state magnitude value is lower than the impulse magnitude value.